

AQUACULTURE

A Second Look at Sea Lice

A new study has reopened an old debate over the potential health risks that fish farms pose to wild fish populations, concluding that “productivity of wild salmon is not negatively associated with either farm lice numbers or farm fish production.”¹ The paper by Gary Marty, a research associate at the University of California, Davis, and fish pathologist with the British Columbia Ministry of Agriculture, and two colleagues pooled data from fish farms in western Canada with data first presented in 2007 by Krkošek et al.² The earlier paper concluded that infestations of ectoparasitic sea lice from salmon farms were driving a decline in wild pink salmon (*Oncorhynchus gorbuscha*) populations in British Columbia’s Broughton Archipelago and that extinction would occur if the infestations continued.

Sea lice pose no direct threat to humans who consume the fish; furthermore they’re removed during the harvesting process. But the new study¹ contributes to the larger ongoing discussion of whether a large-scale aquaculture industry can be sustainable in terms of human and ecosystem health.

Marty says earlier analyses omitted relevant factors from a medical perspective—that is, a diagnostic approach to fish health and epidemiologic factors, rather than a model-driven analysis. For the new study, he and his colleagues obtained proprietary monthly sea lice data from fish farms in the region, giving what they call a fuller picture of the salmon decline in 2001–2002 than the previous analyses, which relied on sea lice counts from wild fish only.

According to Marty, the new analysis suggests pink salmon populations are within a natural pattern of fluctuation. “Our paper estimates that sea lice numbers on farmed fish were greater in 2000 than in 2001, and the wild pink salmon exposed to those sea lice in 2000 came back in record high numbers in 2001,” he says.

Martin Krkošek, lead author of the 2007 paper² and a lecturer in zoology at the University of Otago in Dunedin, New Zealand, says

the new analysis was limited by the omission of data from the affected region prior to infestations as well as nearby regions where there are no salmon farms. Analyses that used the spatial and temporal controls from a larger picture of salmon abundance in the Broughton Archipelago, Krkošek says, “have found effects of sea lice.”^{3,4}

Jeff Silverstein, national aquaculture program leader for the U.S. Department of Agriculture, notes that although the earlier paper² suggested sea lice from salmon farms caused wild salmon declines, “The recent study¹ has managed to show that the correlations don’t appear to be causative.” Ian Bricknell, director of the Aquaculture Research Institute at the University of Maine in Orono, adds, “The epidemiological approach . . . is a much more effective way of analyzing this data.” Bricknell says Marty et al. “looked at many more variables than just lice and salmon (as was done earlier) and have backed it up by testing their model with biological data.”

Krkošek agrees other factors may have contributed to the 2002 decline but strongly disagrees with the conclusion that sea lice do not negatively affect wild salmon productivity.⁴ “While one may speculate about the possibility of other factors that could have contributed, it is known—not speculated—that lice numbers were very high on those fish,” he says.

Marty insists the study’s most important impact lies in showing how medical analysis brings a broader perspective to fish population studies. “I want people to focus on what is actually causing salmon populations to go up and down,” he says. “We should still look at sea lice but include other factors as well.”

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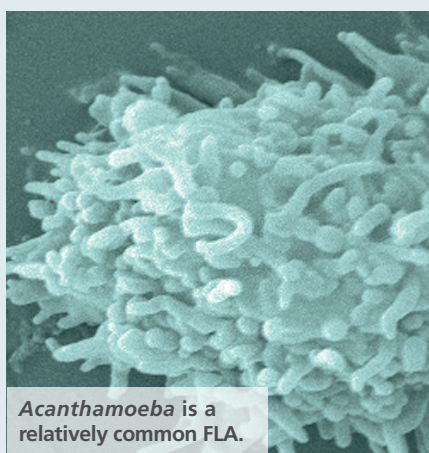
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genital birth defect that affects 70 in 10,000 male births. A study of 471 mother–son pairs showed maternal exposure to THMs did not explain the risk of hypospadias but that women who drank more than a liter of cold tap water per day had a 70% higher chance of having a baby with the birth defect, a finding the authors say needs further exploration.³ They also stress the importance of adequate fluid intake for pregnant women.

Funds to Study Combined Effects of Social Stressors, Pollutants

In January 2011 the EPA announced new grants in support of a nationwide interdisciplinary effort to study poor and underserved communities that have extensive pollution problems.⁴ Funded projects will examine social and societal factors that may modify how pollutants affect human health. The program will focus on multiple pollutants, where programs in the past have generally focused on single chemicals.



Acanthamoeba is a relatively common FLA.

Free-Living Amoebas Common in Water Systems

A growing body of research has shown so-called free-living amoebas (FLAs) increase the quantity and virulence of water-based pathogens such as *Legionella* and *Mycobacterium* spp. A recently published

review shows FLAs can break through water treatment barriers and enter drinking water distribution systems, where they can colonize and grow, especially in reservoirs and home plumbing.⁵ FLAs were found in 45% of the water samples in the studies reviewed, reflecting treated drinking water systems from around the world. The health impact of these prevalent FLAs has yet to be determined.

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